

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Stoyanov et. al.

Attorney Docket No. 25277

Application No. 10/748,930

Group Art Unit: 1731

Filed: 12/30/03

Examiner: Cordray, Dennis R.

Title: Individualized Intrafiber Crosslinked Cellulosic Fiber With Improved Brightness and Color

DECLARATION OF ANGEL STOYANOV PURSUANT TO § 37 C.F.R. § 1.132

Federal Way, WA,
September 29, 2006

TO THE COMMISSIONER OF PATENTS:

I, Angel Stoyanov, declare and state as follows:

1. I am currently employed by the Weyerhaeuser Company as a Scientist and since 1998 have worked exclusively on crosslinking of cellulosic fibers.
2. I received my Bachelor of Science and my Master Of Science from the University of Chemical Technology and Metallurgy at Sofia, Bulgaria, in 1980 and 1981, respectively. After graduation my work history is as follows:

I was a Research Assistant from 1982 to 1986 and an Assistant Professor from 1986 to 1994 at the University of Chemical Technology and Metallurgy at Sofia, Bulgaria. From 1990 to 1991 I worked under a Fulbright scholarship at the University of Washington, Seattle, WA, and completed all graduate courses for a Ph. D. in 1996. From

1996 to 1998 I conducted research for my Ph. D. and held various teaching positions in the Department of Engineering at the University of Washington.

3. I have read and am familiar with the Hansen et al patent US Patent No. 6,340,411

4. Hansen et al state in the '411 patent that initial application of the binder on high bulk fibers preferably occurs after the curing step, particularly if the binder is capable of functioning as a crosslinking material. Hansen then states that specific binders that can also crosslink are polyols, polyaldehydes, polycarboxylic acids and polyamines. If such binders are present during curing, the binder will be consumed during the curing step to form covalently crosslinked bonds. When this occurs, the binder is no longer available for hydrogen bonding or coordinate covalent bonding, and particle binding to fibers is ineffective, column 34, line 1-13.

5. Tests were undertaken to determine if polyols indeed act as crosslinking agents with cellulose. Accordingly, I planned and supervised experiments which were carried out by my technician Derik Rieger.

6. Exhibit A shows the experimental design for the tests. All samples were cured at 171°C for 7 minutes. The acronyms are as follows: COP, chemical on pulp (CF416 pulp from Weyerhaeuser Co.); SHP, sodium hypophosphite; CA, citric acid; SOR, sorbitol; and XYL, xylitol. Exhibit B shows the addition levels for the various reagents; Exhibit C gives the procedure, Exhibit D shows the results of brightness testing by TAPPI T 525 om-02 and Exhibit E, the FAQ wet bulk results determined by the procedure in the application. The Hunter color values were determined by TAPPI T 1231 sp 98. Whiteness Index, WI_(CDM-L), was calculated from the formula, WI_(CDM-L) = (L-3b).

7. The results are summarized in Table 1.

Table 1

Fiber Properties

Sample	FAQ Wet Bulk, cc/g						ISO Brightness %	L	a	b	WI _{1(CDM-L)}
	CA	SHP	Sorbitol	Xylitol	FAQ Wet Bulk, cc/g	ISO Brightness %					
A	0	0	0	0	11.59	82.7	94.9	-0.83	5.58	78.16	
B	0	2	0	0	12.26	82.8	95.0	-0.83	5.58	77.87	
C	8	2	0	0	18.48	78.5	94.7	-2.02	8.67	68.69	
D	8	2	2	0	18.29	83.7	95.3	-1.41	5.53	78.71	
E	8	2	6	0	17.05	85.4	95.7	-1.23	4.80	81.3	
F	8	2	0	2	18.18	84	95.6	-1.45	5.7	78.50	
G	8	2	0	6	16.83	85.8	95.7	-1.21	4.53	82.10	
H	0	2	2	0	11.43	82.3	94.8	-0.88	5.81	77.37	
I	0	2	6	0	11.10	81.4	94.4	-0.81	5.96	76.52	
J	0	2	0	2	11.27	80.5	94.1	-0.78	6.20	75.50	
K	0	2	0	6	10.76	79.8	93.3	-0.76	5.60	76.50	

8. It is well recognized by those skilled in the art of crosslinked fibers that an increase in FAQ wet bulk, relative to an untreated control, reflects that fibers have been crosslinked.

9. Sample A is a control and Sample B is the pulp with 2 percent by dry weight sodium hypophosphate; FAQ wet bulk values are 11.59 and 12.26 cc/g, respectively, and $WI_{(CDM-L)}$ values are 78.16 and 77.87, respectively. When pulp is treated with citric acid and sodium hypophosphate, Sample C, FAQ wet bulk is 18.48 cc/g and the Whiteness Index is 68.69. When pulp is treated with citric acid, sodium hypophosphate and sorbitol, a polyol, at the 2 and 6 percent by weight level of sorbitol on pulp, Samples D and E, respectively, FAQ wet bulk is significantly increased to 18.29 and 17.05 cc/g, respectively. The Whiteness Index of Samples D and E, also increased to 78.71 and 81.30, respectively. However, when pulp is treated only with sodium hypophosphate and two different levels of sorbitol, 2 and 6 percent by weight, Samples H and I, there is no increase in FAQ wet bulk; Whiteness Index, decreased relative to the control pulp and the pulp sample with only sodium hypophosphate, Samples A and B, respectively.

When pulp is treated with citric acid, sodium hypophosphate and xylitol, a polyol, at the 2 and 6 percent by weight level of xylitol on pulp, Samples F and G, respectively, FAQ wet bulk is significantly increased to 18.18 and 16.83 cc/g, respectively. The Whiteness Index of Samples F and G, also increased to 78.50 and 82.10, respectively. However, when pulp is treated only with sodium hypophosphate and two different levels of xylitol, 2 and 6 percent by weight, Samples J and K, there is no increase in FAQ wet bulk; Whiteness Index $WI_{(CDM-L)}$, decreased relative to the control pulp and the pulp with only sodium hypophosphate, Samples A and B, respectively.

10. Based on the fact that there is no increase in FAQ wet bulk when pulp is treated only with sodium hypophosphate and sorbitol, or only with sodium hypophosphate and xylitol, it is my opinion that the polyol, sorbitol, and the polyol, xylitol, do not crosslink with cellulose.

11. In accordance with accepted Patent Office Practice, the dates in the laboratory notebook pages presented in Exhibits A- E have been redacted.

12. I hereby declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued therefrom.

Respectfully submitted,

Date 9/29/06

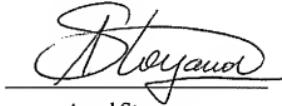

Angel Stoyanov

EXHIBIT A

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Project No. _____
Book No. 11680

TITLE: Experiment 145 Solutions

From Page No. _____

Weyerhaeuser Confidential

Patent Action

Title: Experiment # 145: CA + Polyols for Patent action

Objective(s): Investigate whether polyols will be involved in crosslinking of cellulose fibers under the conditions used for esterification of cellulose with CA

Materials:

- Pulp: CF416 - 94%
- Sample size: 20 g
- Xlinker: CA
- Catalyst: SHP ⁹⁹
- Polyols: Sorbitol (Sorbitex) and Xylitol (Xylidex) ^{98%}
- Fiberizer: 6" pad former
- Dispatch oven
- Metal baskets for curing

Experimental Design:

Sample ID	Chemistry	XLinker	SHP	Polyol		Cure Temp.	Cure time (min.)
				Sorbitol (% COP)	Xylitol (% COP)		
A	<u>Blank</u>		0	0	0	340	7
B	<u>Pulp+SHP</u>		0	2	0	340	7
C	<u>CA+SHP</u>		8	2	0	340	7
D	<u>CA+SHP+SOR</u>		8	2	2	340	7
E	<u>CA+SHP+SOR</u>		8	2	6	340	7
F	<u>CA+SHP+XYL</u>		8	2	0	340	7
G	<u>CA+SHP+XYL</u>		8	2	0	340	7
H	<u>SHP+SOR</u>		0	2	2	340	7
I	<u>SHP+SOR</u>		0	2	6	340	7
J	<u>SHP+XYL</u>		0	2	0	340	7
K	<u>SHP+XYL</u>		0	2	0	340	7

Procedure:

1. Weigh the sample 20 g (odb);
2. Apply the crosslinking solution using the usual syringe method;
3. Leave the samples overnight in a sealed plastic bag;
4. Use the 6" pad former for fluffing (50% consistency);
5. Cure the samples in the Despatch V Series oven;
6. Store the cured fibers in a plastic bag.

Testing:

1. AFAQ Wet Bulk at 0.6 kPa
2. Brightness/Color

Witnessed & Understood by me, _____ Date _____

Invented by
DR. K. Leger
Recorded by
[Signature]

Date _____

EXHIBIT B

Project No. _____
Book No. 14680TITLE Expt 145 solutions

From Page No. ____

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Exp# 145:CA+ Polyols for patent action

Date: _____

Pulp CF418

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
A	CA	0	20	100	0.000	_____
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	0	20	1.20	0.000	_____

pH 7.15

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
B	CA	0	20	100	0.000	_____
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.483

pH 7.06

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
C	CA	8	20	100	1.600	1.597
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.482

pH 7.06

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
D	CA	8	20	100	1.600	1.603
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.479

pH 7.06

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
E	CA	8	20	100	1.600	1.603
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.480

pH 7.06

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
F	CA	8	20	100	1.600	1.605
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.480

pH 7.06

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
G	CA	8	20	100	1.600	1.601
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.481

pH 7.06

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
H	Sorbitol	2	20	100	0.400	0.399
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.485

pH 7.06

P# 473

To Page No. _____

Witnessed & Understood by me,

Date

Invented by D. Cripe D. Dippel

Date

Reported by [Signature]

EXHIBIT B

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Project No.
Book No. 19660

TITLE 894 145 Solution DATA

From Page No.

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
	Sorbitol	6	20	100	1.200	1.202
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.482

pH 4.72

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
J	Xylitol	2	20	100	0.400	0.401
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.489

pH 4.75

Sample ID	Reagent	%Concentration	Final Volume(g)	%Solids	Amount to be weighed	Actual amount
K	Xylitol	6	20	100	1.200	1.199
	Reagent	%Concentration	Final Volume(g)	SHP formula	Amount to be weighed	Actual amount
	SHP	2	20	1.20	0.482	0.484

pH 4.75

Witnessed & Understood by me,

Date

Invented by

D. R. Riger
Recorded by

To Page No.

EXHIBIT C

TITLE Expt#145: CA + Polyols for Patent action Book No: 14680

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From File No. [REDACTED]

- CF410 - Pulp used - 20g ED. @ 94% consistency - 21.28g Pulp			
(TARGET weight(g))		Actual weight(g)	Pulp + solution(g)
A)	21.28g	- 21.29	- 40.88
B)		- 21.15	- 41.06
C)		- 21.21	- 41.15
D)		- 21.38	- 41.26
E)		- 21.34	- 41.31
F)		- 21.23	- 41.33
G)		- 21.37	- 41.17
H)		- 21.15	- 41.03
I)		- 21.34	- 41.13
J)		- 21.25	- 40.98
K)		- 21.22	- 41.13

- Prepared solutions on [REDACTED]
- Applied to sheets
- Fiberized on [REDACTED] - Visual on fibers appears to be no different between samples, pre-curing.
- Samples air dry on table top for 4 hours before curing.
- Samples cured @ 840° for 7 min each on [REDACTED]
- Samples placed in 50K bathy room before FAQ testing, [REDACTED]
- TESTED Brightness + color on [REDACTED]
- FAQ TESTER in minizone NOT used after many controls would not come into specs. [REDACTED] FAQ TESTER in 116 was used

Witnessed & Understood by me,

Date

Invented by

John P. Miller

Recorded by

To Page No. _____

Date

EXHIBIT D

Project No.
Book No. 14660

TITLE Expt 145 Brightness Results

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From Page No. .

Exp#	Sample#	side	position	Operator	TEST DATE	BRIGHTNESS	R(X)	R(Y)	R(Z)	X	Y	Z	L	a
145	A	a	1	D	08/03/06	82.44	91.01	89.69	82.21	87.52	89.69	97.2	94.7	-0.84
145	A	a	2		08/03/06	82.42	91	89.65	82.18	87.5	89.65	97.16	94.69	-0.8
145	A	a	3		08/03/06	82.39	90.95	89.64	82.14	87.48	89.64	97.12	94.65	-0.82
145	A	b	1		08/03/06	83.03	91.79	90.41	82.76	88.24	90.41	97.85	95.08	-0.81
145	A	b	2		08/03/06	83.05	91.8	90.44	82.79	88.25	90.44	97.88	95.1	-0.85
145	A	b	3		08/03/06	83.04	91.77	90.42	82.78	88.23	90.42	97.87	95.09	-0.85
					Average	82.7	91.4	90.0	82.5	87.9	90.0	97.5	94.9	-0.8
					StdDev	0.3	0.4	0.4	0.3	0.4	0.4	0.2	0.0	
145	B	a	1	D	08/03/06	81.85	91.13	89.63	81.58	87.49	89.88	96.45	94.7	-0.88
145	B	a	2		08/03/06	81.87	91.05	89.58	81.42	87.39	89.58	96.27	94.85	-0.87
145	B	a	3		08/03/06	81.87	91.07	89.59	81.4	87.41	89.59	96.24	94.86	-0.87
145	B	b	1		08/03/06	83.8	92.16	90.92	83.57	88.69	90.92	98.81	95.35	-0.91
145	B	b	2		08/03/06	83.82	92.2	90.94	83.57	88.72	90.94	98.81	95.36	-0.88
145	B	b	3		08/03/06	83.79	92.15	90.89	83.55	88.68	90.89	98.79	95.34	-0.87
					Average	82.8	91.8	90.3	82.5	88.1	90.3	97.6	95.0	-0.9
					StdDev	1.1	0.6	0.7	1.2	0.7	0.7	1.4	0.4	0.0
145	C	a	1	D	08/03/06	78.52	91.12	89.54	77.97	86.77	89.54	92.19	94.83	-1.96
145	C	a	2		08/03/06	78.54	91.12	89.56	77.98	86.77	89.56	92.2	94.83	-2
145	C	a	3		08/03/06	78.55	91.19	89.52	78.25	86.63	89.53	92.25	94.87	-2.02
145	C	b	1		08/03/06	78.29	91	89.59	77.72	86.9	89.59	91.89	94.85	-2.03
145	C	b	2		08/03/06	78.61	91.57	89.03	78.07	87.13	89.33	92.24	94.83	-2.02
145	C	b	3		08/03/06	78.67	91.53	89.02	78.07	87.11	89.32	92.31	94.83	-2.02
					Average	78.5	91.3	89.7	78.6	89.27	89.2	91.47	94.83	-2.0
					StdDev	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.0	
145	D	a	1	D	08/03/06	83.64	91.07	91.05	83.47	88.52	91.05	98.65	95.42	-1.48
145	D	a	2		08/03/06	84.11	92.19	91.28	83.7	87.44	91.28	98.96	95.54	-1.48
145	D	a	3		08/03/06	84.26	92.33	91.37	83.85	88.86	91.37	99.15	95.59	-1.38
145	D	b	1		08/03/06	83.29	91.33	90.38	82.85	87.9	90.38	98	95.07	-1.38
145	D	b	2		08/03/06	83.35	91.41	90.45	82.94	87.98	90.45	98.06	95.1	-1.37
145	D	b	3		08/03/06	83.5	91.52	90.59	83.09	88.05	90.59	98.24	95.18	-1.42
					Average	83.7	91.8	90.9	83.3	88.4	90.9	98.5	95.3	-1.4
					StdDev	0.4	0.2	0.4	0.4	0.4	0.4	0.5	0.2	0.0
145	E	a	1	D	08/03/06	85.07	92.18	91.39	84.78	85.94	91.39	100.23	95.6	-1.28
145	E	a	2		08/03/06	85.52	92.57	91.75	85.19	88.33	91.75	100.72	95.78	-1.22
145	E	a	3		08/03/06	85.63	92.03	91.8	85.26	88.36	91.8	100.81	95.81	-1.19
145	E	b	1		08/03/06	85.11	92.16	91.37	84.81	88.93	91.37	100.27	95.59	-1.28
145	E	b	2		08/03/06	85.34	92.42	91.8	85	89.17	91.6	100.5	95.71	-1.23
145	E	b	3		08/03/06	85.67	92.09	91.88	85.36	89.46	91.86	100.92	95.66	-1.22
					Average	85.4	92.4	91.5	85.1	89.2	91.5	100.6	95.7	-1.2
					StdDev	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.0
145	F	a	1	D	08/03/06	83.6	91.9	91.72	83.22	88.55	91.08	98.83	95.48	-1.45
145	F	a	2		08/03/06	83.91	92.35	91.34	83.48	88.82	91.34	98.71	95.57	-1.43
145	F	a	3		08/03/06	83.94	92.38	91.39	83.49	88.85	91.39	98.71	95.58	-1.43
145	F	b	1		08/03/06	83.09	92.24	91.3	83.5	85.78	91.3	98.65	95.65	-1.47
145	F	b	2		08/03/06	84.17	92.4	91.43	83.73	88.91	91.43	99	95.62	-1.43
145	F	b	3		08/03/06	84.09	92.31	91.38	83.69	88.83	91.38	98.95	95.59	-1.48
					Average	84.8	92.3	91.3	83.5	88.8	91.3	98.8	95.6	-1.5
					StdDev	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.0
145	G	a	1	D	08/03/06	85.64	92.26	91.54	85.38	89.12	91.54	100.82	95.68	-1.23
145	G	a	2		08/03/06	86.06	92.65	91.9	85.74	89.5	91.9	101.38	95.88	-1.17
145	G	a	3		08/03/06	86.04	92.67	91.69	85.74	89.51	91.89	101.37	95.88	-1.14
145	G	b	1		08/03/06	85.66	92.46	91.71	85.53	89.31	91.71	101.13	95.77	-1.19
145	G	b	2		08/03/06	85.66	92.3	91.55	85.29	88.14	91.55	100.85	95.68	-1.21
145	G	b	3		08/03/06	85.47	92.13	91.43	85.16	88.98	91.43	100.89	95.62	-1.3
					Average	85.8	92.4	91.7	85.5	89.3	91.7	101.1	95.7	-1.2
					StdDev	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.1
145	H	a	1	D	08/03/06	82.22	91.17	89.78	81.93	87.59	86.78	98.87	94.75	-0.88
145	H	a	2		08/03/06	82.22	91.15	89.75	81.93	87.57	86.75	98.87	94.74	-0.85
145	H	a	3		08/03/06	82.17	91.09	89.72	81.57	87.51	86.72	98.79	94.72	-0.89
145	H	b	1		08/03/06	82.43	91.36	89.97	82.12	87.78	89.97	97.09	94.85	-0.88
145	H	b	2		08/03/06	82.35	91.31	89.93	82.05	87.72	89.03	97.01	94.83	-0.89
145	H	b	3		08/03/06	82.26	91.29	89.8	81.97	87.69	88.9	95.81	94.81	-0.89
					Average	82.3	91.2	89.8	82.0	87.6	89.8	96.9	94.6	-0.89
					StdDev	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0

To Page No. .

-Witnessed & Understood by me, --

Date

Invented by

Recorded by

Date

EXHIBIT D

TITLE Expt 145 Benzyl ResultsBook No. 14600

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From Page No.

b	L*	a*	b*				HUNTER WSTM CIE TINT
5.52	95.87	-0.81	5.51	0	0	575.06	5.25 89.69 59.6 64.42 -1.93
5.52	95.85	-0.77	5.51	0	0	575.15	5.26 89.65 59.77 64.38 -1.99
5.54	95.85	-0.79	5.54	0	0	575.11	5.28 89.64 59.64 64.27 -1.97
5.83	96.17	-0.78	5.62	0	0	575.16	5.34 90.41 59.81 64.74 -2.03
5.83	96.16	-0.82	5.62	0	0	575.07	5.34 90.44 59.83 64.77 -1.97
5.62	96.17	-0.82	5.81	0	0	575.05	5.33 90.42 59.86 64.79 -1.96
5.6	96.0	-0.8	5.6	0.0	0.0	575.1	5.3 90.0 59.8 -54.6 -2.0
0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.4 0.1 0.2
5.69	95.87	-0.85	5.99	0	0	575.12	5.71 89.68 57.27 62.21 -2.14
6.03	95.82	-0.84	6.04	0	0	575.17	5.76 89.58 56.96 61.89 -2.19
6.08	95.83	-0.84	6.06	0	0	575.18	5.79 89.59 56.83 61.77 -2.21
5.4	96.35	-0.87	5.37	0	0	574.8	5.08 90.92 61.51 68.42 -1.72
5.41	96.39	-0.85	5.38	0	0	574.87	5.09 90.94 61.46 68.39 -1.76
5.39	96.37	-0.84	5.36	0	0	574.89	5.07 90.89 61.53 68.43 -1.77
5.7	96.1	-0.8	5.7	0.0	0.0	575.8	5.4 90.3 59.3 64.2 -2.0
0.3	0.3	0.0	0.4	0.0	0.0	0.2	0.7 2.5 2.4 0.2
8.56	95.81	-1.92	8.08	0	0	573.8	8.17 89.54 43.27 49.58 -1.85
8.56	95.81	-1.94	8.08	0	0	573.76	8.17 89.50 43.27 49.58 -1.8
8.58	95.81	-1.95	8.71	0	0	573.72	8.10 89.03 43.2 49.57 -1.78
8.78	95.82	-1.97	8.92	0	0	573.79	8.39 89.59 42.12 48.57 -1.85
8.79	95.87	-1.96	8.93	0	0	573.82	8.39 89.93 42.28 48.91 -1.91
8.75	95.86	-1.97	8.88	0	0	573.77	8.34 89.92 42.53 49.12 -1.85
5.7	95.8	-2.0	6.8	0.0	0.8	573.8	8.3 89.7 42.8 49.2 -1.8
0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.2 0.5 0.4 0.6
5.56	96.43	-1.41	5.54	0	0	573.29	5.14 91.05 60.71 85.77 -0.86
5.55	96.52	-1.41	5.52	0	0	573.28	5.12 91.28 60.97 86.08 -0.86
5.5	96.56	-1.33	5.47	0	0	573.49	5.06 91.37 61.32 86.44 -0.97
5.52	96.15	-1.33	5.5	0	0	573.5	5.12 90.38 60.41 85.23 -0.98
5.52	96.16	-1.32	5.51	0	0	573.54	5.13 90.45 60.43 85.27 -1.01
5.51	96.24	-1.38	5.49	0	0	573.37	5.11 90.59 60.6 85.49 -0.9
5.5	96.3	-1.4	5.5	0.0	0.0	573.4	5.1 90.9 60.7 85.7 -0.9
0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0 0.4 0.5 0.1
4.84	95.57	-1.24	4.8	0	0	573.20	4.44 91.39 64.95 69.55 -0.73
4.79	95.72	-1.17	4.75	0	0	573.43	4.4 91.75 65.51 70.18 -0.81
4.78	95.74	-1.15	4.73	0	0	573.51	4.38 91.8 65.65 70.3 -0.84
4.8	95.58	-1.22	4.76	0	0	573.29	4.4 91.37 65.14 69.87 -0.74
4.82	95.65	-1.19	4.78	0	0	573.41	4.42 91.6 65.22 69.98 -0.8
4.76	95.77	-1.16	4.71	0	0	573.34	4.36 91.86 65.89 70.45 -0.75
4.8	95.7	-1.2	4.8	0.0	0.0	573.4	4.4 91.6 65.9 70.8 -0.8
0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.3 0.4 0.5 0.0
5.77	96.44	-1.4	5.78	0	0	573.46	5.34 91.08 59.84 64.86 -1
5.75	96.55	-1.38	5.73	0	0	573.52	5.33 91.34 59.91 65.21 -1.03
5.78	96.57	-1.41	5.78	0	0	573.46	5.35 91.39 59.79 65.13 -1
5.64	96.63	-1.42	5.61	0	0	573.33	5.2 91.3 60.51 65.71 -0.9
5.64	96.59	-1.38	5.61	0	0	573.44	5.21 91.43 60.63 65.87 -0.96
5.63	96.57	-1.43	5.61	0	0	573.3	5.19 91.36 60.82 65.83 -0.88
5.7	96.5	-1.4	5.7	0.8	0.0	573.4	5.3 91.3 60.2 65.4 -1.0
0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1 0.5 0.4 0.1
4.52	96.63	-1.18	4.47	0	0	573.17	4.13 91.54 66.81 71.18 -0.84
4.49	96.76	-1.12	4.44	0	0	573.35	4.11 91.9 67.28 71.72 -0.72
4.49	96.78	-1.1	4.44	0	0	573.45	4.11 91.66 67.28 71.71 -0.78
4.52	96.7	-1.14	4.47	0	0	573.31	4.13 91.71 67 71.41 -0.7
4.57	96.63	-1.17	4.52	0	0	573.26	4.19 91.55 66.54 70.98 -0.89
4.59	96.59	-1.25	4.54	0	0	572.97	4.19 91.43 66.35 70.75 -0.55
4.5	96.7	-1.2	4.5	0.0	0.0	573.3	4.1 91.7 66.8 71.3 -0.7
0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.4 0.4 0.1
5.8	95.01	-0.84	5.8	0	0	575.06	5.52 89.78 58.37 63.21 -2.03
5.78	95.69	-0.82	5.77	0	0	575.12	5.5 89.75 58.49 63.3 -2.06
5.5	95.68	-0.87	5.8	0	0	574.99	5.52 89.72 58.32 63.14 -1.99
5.8	95.98	-0.84	5.79	0	0	575.07	5.51 89.97 58.66 63.45 -2.03
5.62	95.97	-0.86	5.81	0	0	575.02	5.53 89.93 58.41 63.31 -2.01
15.86	95.95	-0.86	5.65	0	0	575.04	5.57 89.9 58.19 63.1 -2.04
5.8	95.9	-0.8	5.8	0.0	0.0	575.1	5.5 89.8 58.4 63.3 -2.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1 0.1 0.0

To Page No. _____

Witnessed & Understood by me,

Date

Invented by
Edgar Roger
Recorded by

Date

EXHIBIT D

90

Project No.
Book No. 14660

TITLE Expt# 145 Brightness Results

From Page No. 1

Exp#	Sample#	side	position	Operator	TEST DATE	BRIGHTNESS	R(X)	R(Y)	R(Z)	X	Y	Z	L	a
145	1	a	1	D	08/03/06	81.45	90.84	89.10	81.19	87.03	89.18	96	94.43	-0.6
145	1	a	2		08/03/06	81.47	90.63	89.16	81.21	87.03	89.18	96.01	94.42	-0.7
145	1	a	3		08/03/06	81.36	90.56	89.09	81.11	86.95	89.09	95.9	94.38	-0.51
145	1	b	1		08/03/06	81.48	90.77	89.27	81.18	87.13	89.27	95.48	94.48	-0.81
145	1	b	2		08/03/06	81.38	90.71	89.21	81.07	87.08	89.21	95.25	94.45	-0.83
145	1	b	3		08/03/06	81.38	90.73	89.21	81.06	87.08	89.21	95.88	94.45	-0.79
					Average	81.4	90.7	89.2	81.1	87.0	89.2	95.9	94.4	-0.5
					StDev	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
145	J	a	1	D	08/03/06	80.46	90.06	88.51	80.11	86.32	88.51	94.81	94.08	-0.78
145	J	a	2		08/03/06	80.47	90.05	88.47	80.2	86.37	88.47	94.82	94.06	-0.77
145	J	a	3		08/03/06	80.33	89.95	88.36	80.07	86.27	88.38	94.87	94.01	-0.78
145	J	b	1		08/03/06	80.72	90.03	88.78	80.45	86.46	88.78	95.12	94.22	-0.78
145	J	b	2		08/03/06	80.50	90.27	88.68	80.3	86.57	88.68	94.94	94.17	-0.77
145	J	b	3		08/03/06	80.49	90.10	88.6	80.2	86.45	88.6	94.82	94.13	-0.79
					Average	80.5	90.2	88.6	80.2	86.5	88.6	94.9	94.1	-0.8
					StDev	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.0
145	K	a	1	D	08/03/06	80.24	88.94	87.55	80	85.46	87.56	94.59	93.58	-0.6
145	K	a	2		08/03/06	80.3	88.99	87.59	80.06	85.51	87.59	94.65	93.59	-0.75
145	K	a	3		08/03/06	80.29	88.97	87.57	80.05	85.5	87.57	94.64	93.58	-0.74
145	K	b	1		08/03/06	79.49	87.99	88.63	79.25	84.57	88.63	93.7	93.07	-0.70
145	K	b	2		08/03/06	79.35	87.87	88.5	79.1	84.45	88.5	93.52	93	-0.75
145	K	b	3		08/03/06	79.33	87.86	88.5	79.08	84.43	88.5	93.5	93.01	-0.78
					Average	79.8	88.4	87.1	78.6	85.0	87.1	94.1	93.3	-0.6
					StDev	0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.3	0.0

To Page No. 1

Witnessed & Understood by me,

Date

Invented by

DeeDee Ridge

Date

Recorded by

EXHIBIT D

TITLE: ENQ H-145 Brightness Results Book No. 14680

91

From Page No.:

b	L*	a*	b*		HUNTER W3TMICIE V. CIE TINT						
5.91	95.55	0.77	5.91	0	0	575.32	5.06	89.16	57.29	82	-2.25
5.89	95.65	-0.76	5.9	0	0	575.34	5.05	89.16	57.38	82.05	-2.26
5.92	95.62	-0.78	5.93	0	0	575.27	5.08	89.09	57.36	81.85	-2.22
5	95.89	-0.76	6.01	0	0	575.3	5.75	89.27	56.88	81.59	-2.27
6.04	95.57	-0.8	6.05	0	0	575.27	5.79	89.21	56.63	81.44	-2.27
6.02	95.67	-0.76	6.03	0	0	575.38	5.78	89.21	56.7	81.5	-2.33
6.0	95.7	-0.8	6.0	0.0	0.0	575.3	5.7	89.2	57.0	81.8	-2.3
0.1	0.0	0.0	0.1	0.0	0.0	575.3	0.1	0.3	0.3	0.0	
6.19	95.37	-0.78	6.21	0	0	575.44	5.07	88.51	55.25	59.9	-2.45
6.18	95.30	-0.74	6.18	0	0	575.48	5.05	88.47	55.38	60	-2.47
6.19	95.32	-0.75	6.21	0	0	575.48	5.06	88.38	55.14	59.74	-2.47
6.19	95.49	-0.75	6.21	0	0	575.48	5.07	88.76	55.46	60.21	-2.46
9.23	95.45	-0.75	6.25	0	0	575.48	6.01	88.88	55.16	59.9	-2.49
6.25	95.41	-0.76	6.27	0	0	575.44	6.03	88.6	55	59.72	-2.48
6.2	95.4	-0.8	6.2	0.0	0.0	575.5	6.0	88.6	55.2	59.9	-2.5
0.9	0.1	0.0	0.0	0.0	0.0	575.5	0.4	0.1	0.2	0.2	0.0
5.68	94.98	-0.77	5.67	0	0	575.22	5.46	87.56	57.32	61.34	-2.1
5.63	94.09	-0.73	5.68	0	0	575.34	5.44	87.59	57.46	61.48	-2.17
5.63	94.08	-0.71	5.65	0	0	575.37	5.44	87.57	57.47	61.49	-2.19
5.54	94.58	-0.73	5.57	0	0	575.29	5.38	88.63	57.14	60.8	-2.12
5.57	94.53	-0.72	5.6	0	0	575.33	5.41	88.5	56.9	60.53	-2.15
5.59	94.53	-0.76	5.61	0	0	575.25	5.43	88.5	56.81	60.46	-2.1
5.6	94.8	-0.7	5.6	0.0	0.0	575.3	5.4	87.1	57.2	61.8	-2.1
0.0	0.2	0.0	0.0	0.0	0.0	575.3	0.1	0.0	0.3	0.5	0.0

To Page No.:

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Date

EXHIBIT E

Project No. 1460
Book No. 1460TITLE Expt# 148 PAGE Results

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From Page No.

Test	Ref# or	Experim.	Prob	Blower	Eff	Memloc	Memloc	Operator	Lab	Hum	0.0001Pa	0.0002Pa	Time	Rate	2.0Pa	0.0001Pa	0.0002Pa	Wick	0.0001Pa	0.0002Pa	Wick	0.0001Pa	0.0002Pa	Wick	
Pass	Jobno #	Number	Grade	Type	Cond	Date	Time	Initial	Lab	Hum	0.0001Pa	0.0002Pa	Time	Rate	cc/g	cc/g	cc/g	cc/g	cc/g	cc/g	cc/g	cc/g	cc/g	cc/g	
									Lab 116	1	40.84	24.39	2.8	9.55	9.95	11.74	12.93								
									Lab 116	2	40.57	23.17	2.4	10.83	11.49	11.59	11.59								
									Lab 116	3	40.42	23.00	2.5	10.62	9.78	11.55	12.08								
									Lab 116	4	40.11	23.00	2.37	10.27	9.78	11.56	11.9								
									Lab 116	5	40.00	24.28	2.8	11.27	10.45	12.25	12.25								
									Lab 116	6	40.00	24.28	2.8	10.4	10.46	12.32	12.55								
									Lab 116	7	40.00	24.28	2.8	10.4	10.46	12.28	12.54								
									Lab 116	8	40.00	24.28	2.8	10.4	10.46	12.10	12.10								
									Lab 116	9	40.00	24.28	2.8	10.4	10.46	11.40	11.40								
									Lab 116	10	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	11	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	12	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	13	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	14	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	15	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	16	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	17	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	18	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	19	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	20	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	21	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	22	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	23	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	24	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	25	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	26	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	27	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	28	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	29	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	30	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	31	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	32	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	33	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	34	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	35	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	36	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	37	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	38	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	39	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	40	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	41	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	42	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	43	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	44	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	45	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	46	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	47	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	48	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	49	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	50	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	51	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	52	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	53	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	54	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	55	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	56	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	57	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	58	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	59	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	60	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	61	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	62	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	63	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	64	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	65	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	66	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	67	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	68	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	69	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	70	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	71	40.00	25.29	2.9	10.4	10.46	11.40	11.40								
									Lab 116	72	40.00	25.29	2.9	10.4	10.46	1									